

geographical barriers due to geologic or climatic changes, come to be distinct species—species often distinguished only by superficial differences in color and markings of plumage, etc. The parasites have remained practically unaffected by the conditions which have produced the differences among the birds; the temperature of the host's body, the feathers as food, all of the environment of the parasite is practically

unchanged. The parasitic species thus remains unchanged, while the ancestral *Larus* or *Anas* species becomes differentiated into a dozen or score of specific forms, all with a common parasite. If this proposed solution of the problem may be accepted, it introduces a factor into problems of distribution, where parasites are concerned, which I do not recall having seen presented before.

NOTES ON NEW ENGLAND ACRIDIIDAE, IV,—ACRIDIINAE, I.

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The New England species of Acridiinae or spine-breasted locusts are readily recognized by the presence of a prominent spine or tubercle projecting from the prosternum between the bases of the anterior pair of legs. Sixteen species of this sub-family have been taken in New England; one of these, however, *Schistocerca americana*, being of purely adventitious occurrence. Those that form the fauna proper to the district fall into two groups: two species of *Schistocerca*, and thirteen species of *Melanoplus*. The former genus is at present undergoing revision by Mr. Scudder; the latter group forms the subject of his monumental "Revision of the *Melanoplus*" (Proc. U. S. Nat. Mus., vol. xx, pp. 1-421) to which the student is referred for a general discussion of the group, for systematic characters,

and information concerning its extraliminally.

I have adopted here the sequence of genera and species given in that work, preceded by *Schistocerca*, as follows: *Schistocerca* (3 sp.), *Hesperotettix* (1 sp.), *Podisma* (1 sp.), *Melanoplus* (10 sp., in this order,—*atlantis*, *scudderi*, *mancus*, *fasciatus*, *femur-rubrum*, *extremus*, *minor*, *collinus*, *femoratus*, *punctulatus*), and finally, *Paroxya* (1 sp.). The student dealing with specimens from New England or the northeastern States alone, however, will find a different arrangement of his collection preferable, e. g., the following:—*Schistocerca* (3 sp.), *Paroxya*, *Hesperotettix*, and *Podisma* (each monotypic in New England), and finally *Melanoplus*, in this order: *mancus*, *scudderi*, *atlantis*, *femur-rubrum*, *extremus*, *fasciatus*, *minor*, *collinus*, *punc-*

tulatus, *femoratus*,—or the reverse. The advantage of this arrangement is that it is easy to remember and greatly facilitates comparison of the species most resembling each other, thus, *maneus* and *scuddleri*, *atlantis* and *femur-rubrum*, etc.

The terminology of species is that of Scudder's Revision. The other works referred to are either general treatises or those dealing especially with New England locusts, familiar to the student of Orthoptera and listed in previous parts of these Notes. Two articles by Mr. Scudder of especial interest in this connection will be found in *Psyche*, (1896), p. 367, and the *Proc. Boston Soc. Nat. Hist.*, XIX, p. 284, the former containing a key to the *Melanopli* which may be of assistance to the student. Certain features of this I have embodied in my own, which, however, like those in previous parts of these notes, is constructed with especial reference to the needs of the novice in determining specimens, artificial characters being frequently used instead of systematic, which are often appreciable only after long study of a group. Our species will all be readily recognized with the exception of the females of certain species of *Melanoplus*. These are, without exception, the most difficult to discriminate of all our locusts, owing to the variability of every available character, — width of interspace, form of prosternal spine, valves of ovipositor, cerci, markings, etc.

The present group is much less attractively colored than the *Oedipodinae* though in the living state several of the species are decidedly handsome. While the prevailing color of most of the species of *Melanoplus* is dull olivaceous, a striking variation occurs in *femur-rubrum*, *atlantis*, and *minor*, individuals of both sexes being occasionally found which have the face, top of head and pronotum bright rose-red. Other color-variations are noted in connection with the various species. There is in most species of *Melanoplus* considerable variation in color locally, according to the character of the station where found, and also seasonally, whether collected early or late in the fall. As a rule specimens collected after a number of hard frosts are duller, darker and more suffused than summer examples, the coloration of the individual being apparently considerably modified by such exposure.

In the preparation of this article I have examined over 3000 New England specimens collected chiefly in person and now in my collection, each species being represented, save in two instances, by a large series of specimens. In addition, I have examined for special points, a considerable number belonging to Mr. Scudder, to whom I am indebted for favors in a variety of ways, and whose publications I have freely used, with the result of greatly lightening my labors.